SEQUENCE LISTING

<110> Fischhoff, et al.

<120> SYNTHETIC PLANT GENES AND METHOD FOR PREPARATION

<130> 28079/41786

<140> US 08/434,105
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<151> 1992-10-09

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<160> 40

<170> PatentIn version 3.3

<210> 1
<211> 1743
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic nucleotide sequence encoding Btk HD-1 insecticidal protein (cry1Ab), described in Example 1, and set forth in the lower line of Figure 2

<400> 1
atggctatag aaactggtta caccccaatc gatatttcct tgtcgctaac gcaatttctt 60

ttgagtgaat ttgttcccgg tgctggattt gtgttaggac tagttgatat tatctgggga 120

atttttggtc cctctcaatg ggacgcattt cttgtacaaa ttgaacagct catcaaccag 180

agaatcgaag agttcgctag gaatcaagcc atttctagat tagaaggact aagcaatctt 240

tatcaaattt acgcagaatc ttttagagag tgggaagcag atcctactaa tccagcatta 300

agagaagaga tgcgtattca attcaatgac atgaacagtg cccttacaac cgctattcct 360

ctttttgcag ttcaaaatta tcaagttcct ctcctctccg tgtacgttca agctgccaac 420

ctccacctct cagttttgag agatgtttca gtgtttggac aaaggtgggg atttgatgcc 480

gcgactatca atagtcgtta taatgattta actaggctta ttggcaacta tacagatcat 540

gctgtacgct ggtacaatac gggattagag cgtgtatggg gaccggattc tagagattgg 600

atcaggtaca accagttcag aagagagctt acactaactg tattagatat cgtttctcta 660

tttccgaact atgatagtag aacgtatcca attcgaacag tttcccaatt aacaagagaa 720

atttatacaa acccagtatt agaaaatttt gatggtagtt ttcgaggctc ggctcagggc 780

atagaaggaa gtattaggag tccacatttg atggatatac ttaatagtat aaccatctat 840

acggatgctc atagaggaga atactactgg tccggtcacc agatcatggc ttctcctgta 900

gggttttcgg ggccagaatt cacttttccg ctatatggaa ctatgggaaa tgcagctcca 960

caacaacgta ttgttgctca actaggtcag ggcgtgtata gaacattatc gtccacctta 1020

tatagaagac cttttaacat cgggatcaac aaccaacaac tatctgttct tgacgggaca 1080

gaatttgctt atggaacctc ctcaaatttg ccatccgctg tatacagaaa aagcggaacg 1140

gtagattcgc tggatgaaat accgccacag aataacaacg tgccacctag gcaaggattt 1200

agtcatcgat taagccatgt ttcaatgttt cgttcaggct ttagtaatag tagtgtaagt 1260

ataataagag ctcctatgtt ctcttggata catcgtagtg ctgagttcaa caacatcatc 1320

ccttcatcac aaatcaccca aatcccactc accaagtcta ctaatcttgg ctctggaact 1380

tctgtcgtta aaggaccagg atttacagga ggagatattc ttcgaagaac ttcacctggc 1440

cagatttcaa ccttaagagt aaatattact gcaccattat cacaaagata tcgggtaaga 1500

attcgctacg cttctaccac aaaccttcag ttccacacat caattgacgg aagacctatt 1560

aatcagggga atttttcagc aactatgagt agtgggagta atttacagtc cggaagcttt 1620

aggactgtag gttttactac tccgtttaac ttttcaaatg gatcaagtgt atttacgtta 1680

agtgctcatg tcttcaattc aggcaatgaa gtttatatag atcgaattga atttgttccg 1740

gca 1743

<210> 2
<211> 1743
<212> DNA
<213> Artificial sequence

<220>
<223> Native Btk HD-1 nucleotide sequence encoding Btk HD-1 toxin protein (Cry1Ab) from amino acid 29-607 as described in Example 1 & set forth in the upper line of Figure 2, & includes synthetic sequence encoding N-terminal Met-Ala

<400> 2
atggctatag aaactggtta caccccaatc gatatttcct tgtcgctaac gcaatttctt 60

ttgagtgaat ttgttcccgg tgctggattt gtgttaggac tagttgatat aatatgggga 120

atttttggtc cctctcaatg ggacgcattt cttgtacaaa ttgaacagtt aattaaccaa 180

agaatagaag aattcgctag gaaccaagcc atttctagat tagaaggact aagcaatctt 240

tatcaaattt acgcagaatc ttttagagag tgggaagcag atcctactaa tccagcatta 300

agagaagaga tgcgtattca attcaatgac atgaacagtg cccttacaac cgctattcct 360

ctttttgcag ttcaaaatta tcaagttcct cttttatcag tatatgttca agctgcaaat 420

ttacatttat cagttttgag agatgtttca gtgtttggac aaaggtgggg atttgatgcc 480

gcgactatca atagtcgtta taatgattta actaggctta ttggcaacta tacagatcat 540

gctgtacgct ggtacaatac gggattagag cgtgtatggg gaccggattc tagagattgg 600

ataagatata atcaatttag aagagaatta acactaactg tattagatat cgtttctcta 660

tttccgaact atgatagtag aacgtatcca attcgaacag tttcccaatt aacaagagaa 720

atttatacaa acccagtatt agaaaatttt gatggtagtt ttcgaggctc ggctcagggc 780

atagaaggaa gtattaggag tccacatttg atggatatac ttaatagtat aaccatctat 840

acggatgctc atagaggaga atattattgg tcagggcatc aaataatggc ttctcctgta 900

gggttttcgg ggccagaatt cacttttccg ctatatggaa ctatgggaaa tgcagctcca 960

caacaacgta ttgttgctca actaggtcag ggcgtgtata gaacattatc gtccacctta 1020

tatagaagac cttttaatat agggataaat aatcaacaac tatctgttct tgacgggaca 1080

gaatttgctt atggaacctc ctcaaatttg ccatccgctg tatacagaaa aagcggaacg 1140

gtagattcgc tggatgaaat accgccacag aataacaacg tgccacctag gcaaggattt 1200

agtcatcgat taagccatgt ttcaatgttt cgttcaggct ttagtaatag tagtgtaagt 1260

ataataagag ctcctatgtt ctcttggata catcgtagtg ctgaatttaa taatataatt 1320

ccttcatcac aaattacaca aataccttta acaaaatcta ctaatcttgg ctctggaact 1380

tctgtcgtta aaggaccagg atttacagga ggagatattc ttcgaagaac ttcacctggc 1440

cagatttcaa ccttaagagt aaatattact gcaccattat cacaaagata tcgggtaaga 1500

attcgctacg cttctaccac aaatttacaa ttccatacat caattgacgg aagacctatt 1560

aatcagggga atttttcagc aactatgagt agtgggagta atttacagtc cggaagcttt 1620

aggactgtag gttttactac tccgtttaac ttttcaaatg gatcaagtgt atttacgtta 1680

agtgctcatg tcttcaattc aggcaatgaa gtttatatag atcgaattga atttgttccg 1740

gca 1743

<210> 3
<211> 1845
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic sequence encoding Btk HD-1 insecticidal toxin protein (Cry1Ab), described in Example 2, and set forth in the lower line of Figure 3

<400> 3
atggacaaca acccaaacat caacgaatgc attccataca actgcttgag taacccagaa 60

gttgaagtac ttggtggaga acgcattgaa accggttaca ctcccatcga catctccttg 120

tccttgacac agtttctgct cagcgagttc gtgccaggtg ctgggttcgt tctcggacta 180

gttgacatca tctggggtat ctttggtcca tctcaatggg atgcattcct ggtgcaaatt 240

gagcagttga tcaaccagag gatcgaagag ttcgccagga accaggccat ctctaggttg 300

gaaggattga gcaatctcta ccaaatctat gcagagagct tcagagagtg ggaagccgat 360

cctactaacc cagctctccg cgaggaaatg cgtattcaat tcaacgacat gaacagcgcc 420

ttgaccacag ctatcccatt gttcgcagtc cagaactacc aagttcctct cttgtccgtg 480

tacgttcaag cagctaatct tcacctcagc gtgcttcgag acgttagcgt gtttgggcaa 540

aggtggggat tcgatgctgc aaccatcaat agccgttaca acgaccttac taggctgatt 600

ggaaactaca ccgaccacgc tgttcgttgg tacaacactg gcttggagcg tgtctggggt 660

cctgattcta gagattggat tagatacaac cagttcagga gagaattgac cctcacagtt 720

ttggacattg tgtctctctt cccgaactat gactccagaa cctaccctat ccgtacagtg 780

tcccaactta ccagagaaat ctatactaac ccagttcttg agaacttcga cggtagcttc 840

cgtggttctg cccaaggtat cgaaggctcc atcaggagcc cacacttgat ggacatcttg 900

aacagcataa ctatctacac cgatgctcac agaggagagt attactggtc tggacaccag 960

atcatggcct ctccagttgg attcagcggg cccgagttta cctttcctct ctatggaact 1020

atgggaaacg ccgctccaca acaacgtatc gttgctcaac taggtcaggg tgtctacaga 1080

accttgtctt ccaccttgta cagaagaccc ttcaatatcg gtatcaacaa ccagcaactt 1140

tccgttcttg acggaacaga gttcgcctat ggaacctctt ctaacttgcc atccgctgtt 1200

tacagaaaga gcggaaccgt tgattccttg gacgaaatcc caccacagaa caacaatgtg 1260

ccacccaggc aaggattctc ccacaggttg agccacgtgt ccatgttccg ttccggattc 1320

agcaacagtt ccgtgagcat catcagagct cctatgttct catggattca tcgtagtgct 1380

gagttcaaca atatcattcc ttcctctcaa atcacccaaa tcccattgac caagtctact 1440

aaccttggat ctggaacttc tgtcgtgaaa ggaccaggct tcacaggagg tgatattctt 1500

agaagaactt ctcctggcca gattagcacc ctcagagtta acatcactgc accactttct 1560

caaagatatc gtgtcaggat tcgttacgca tctaccacta acttgcaatt ccacacctcc 1620

atcgacggaa ggcctatcaa tcagggtaac ttctccgcaa ccatgtcaag cggcagcaac 1680

ttgcaatccg gcagcttcag aaccgtcggt ttcactactc ctttcaactt ctctaacgga 1740

tcaagcgttt tcacccttag cgctcatgtg ttcaattctg gcaatgaagt gtacattgac 1800

cgtattgagt ttgtgcctgc cgaagttacc ttcgaggctg agtac 1845

<210> 4
<211> 1845
<212> DNA
<213> Artificial sequence

<220>
<223> Native Btk HD1 nucleotide sequence encoding Btk HD-1 insecticidal toxin protein (Cry1Ab), described in Example 2, and set forth in the upper line of Figure 3

<400> 4

atggataaca atccgaacat caatgaatgc attccttata attgtttaag taaccctgaa 60

gtagaagtat taggtggaga aagaatagaa actggttaca ccccaatcga tatttccttg 120

tcgctaacgc aatttctttt gagtgaattt gttcccggtg ctggatttgt gttaggacta 180

gttgatataa tatggggaat ttttggtccc tctcaatggg acgcatttct tgtacaaatt 240

gaacagttaa ttaaccaaag aatagaagaa ttcgctagga accaagccat ttctagatta 300

gaaggactaa gcaatcttta tcaaatttac gcagaatctt ttagagagtg ggaagcagat 360

cctactaatc cagcattaag agaagagatg cgtattcaat tcaatgacat gaacagtgcc 420

cttacaaccg ctattcctct ttttgcagtt caaaattatc aagttcctct tttatcagta 480

tatgttcaag ctgcaaattt acatttatca gttttgagag atgtttcagt gtttggacaa 540

aggtggggat ttgatgccgc gactatcaat agtcgttata atgatttaac taggcttatt 600

ggcaactata cagatcatgc tgtacgctgg tacaatacgg gattagagcg tgtatgggga 660

ccggattcta gagattggat aagatataat caatttagaa gagaattaac actaactgta 720

ttagatatcg tttctctatt tccgaactat gatagtagaa cgtatccaat tcgaacagtt 780

tcccaattaa caagagaaat ttatacaaac ccagtattag aaaattttga tggtagtttt 840

cgaggctcgg ctcagggcat agaaggaagt attaggagtc cacatttgat ggatatactt 900

aatagtataa ccatctatac ggatgctcat agaggagaat attattggtc agggcatcaa 960

ataatggctt ctcctgtagg gttttcgggg ccagaattca cttttccgct atatggaact 1020

atgggaaatg cagctccaca acaacgtatt gttgctcaac taggtcaggg cgtgtataga 1080

acattatcgt ccaccttata tagaagacct tttaatatag ggataaataa tcaacaacta 1140

tctgttcttg acgggacaga atttgcttat ggaacctcct caaatttgcc atccgctgta 1200

tacagaaaaa gcggaacggt agattcgctg gatgaaatac cgccacagaa taacaacgtg 1260

ccacctaggc aaggatttag tcatcgatta agccatgttt caatgtttcg ttcaggcttt 1320

agtaatagta gtgtaagtat aataagagct cctatgttct cttggataca tcgtagtgct 1380

gaatttaata atataattcc ttcatcacaa attacacaaa tacctttaac aaaatctact 1440

aatcttggct ctggaacttc tgtcgttaaa ggaccaggat ttacaggagg agatattctt 1500

cgaagaactt cacctggcca gatttcaacc ttaagagtaa atattactgc accattatca 1560

caaagatatc gggtaagaat tcgctacgct tctaccacaa atttacaatt ccatacatca 1620

attgacggaa gacctattaa tcaggggaat ttttcagcaa ctatgagtag tgggagtaat 1680

ttacagtccg gaagctttag gactgtaggt tttactactc cgtttaactt ttcaaatgga 1740

tcaagtgtat ttacgttaag tgctcatgtc ttcaattcag gcaatgaagt ttatatagat 1800

cgaattgaat ttgttccggc agaagtaacc tttgaggcag aatat 1845

<210> 5
<211> 1921
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic hybrid of first 1360 bases synthetic HD-1 linked to modified HD-73 sequence, described in paragraph bridging pages 53-54, and as set forth in the lower line of Figure 4

<400> 5
atggacaaca acccaaacat caacgaatgc attccataca actgcttgag taacccagaa 60

gttgaagtac ttggtggaga acgcattgaa accggttaca ctcccatcga catctccttg 120

tccttgacac agtttctgct cagcgagttc gtgccaggtg ctgggttcgt tctcggacta 180

gttgacatca tctggggtat ctttggtcca tctcaatggg atgcattcct ggtgcaaatt 240

gagcagttga tcaaccagag gatcgaagag ttcgccagga accaggccat ctctaggttg 300

gaaggattga gcaatctcta ccaaatctat gcagagagct tcagagagtg ggaagccgat 360

cctactaacc cagctctccg cgaggaaatg cgtattcaat tcaacgacat gaacagcgcc 420

ttgaccacag ctatcccatt gttcgcagtc cagaactacc aagttcctct cttgtccgtg 480

tacgttcaag cagctaatct tcacctcagc gtgcttcgag acgttagcgt gtttgggcaa 540

aggtggggat tcgatgctgc aaccatcaat agccgttaca acgaccttac taggctgatt 600

ggaaactaca ccgaccacgc tgttcgttgg tacaacactg gcttggagcg tgtctggggt 660

cctgattcta gagattggat tagatacaac cagttcagga gagaattgac cctcacagtt 720

ttggacattg tgtctctctt cccgaactat gactccagaa cctaccctat ccgtacagtg 780

tcccaactta ccagagaaat ctatactaac ccagttcttg agaacttcga cggtagcttc 840

cgtggttctg cccaaggtat cgaaggctcc atcaggagcc cacacttgat ggacatcttg 900

aacagcataa ctatctacac cgatgctcac agaggagagt attactggtc tggacaccag 960

atcatggcct ctccagttgg attcagcggg cccgagttta cctttcctct ctatggaact 1020

atgggaaacg ccgctccaca acaacgtatc gttgctcaac taggtcaggg tgtctacaga 1080

accttgtctt ccaccttgta cagaagaccc ttcaatatcg gtatcaacaa ccagcaactt 1140

tccgttcttg acggaacaga gttcgcctat ggaacctctt ctaacttgcc atccgctgtt 1200

tacagaaaga gcggaaccgt tgattccttg gacgaaatcc caccacagaa caacaatgtg 1260

ccacccaggc aaggattctc ccacaggttg agccacgtgt ccatgttccg ttccggattc 1320

agcaacagtt ccgtgagcat catcagagct cctatgttct cttggataca ccgtagtgct 1380

gagttcaaca acatcatcgc atccgatagt attactcaaa tccctgcagt gaagggaaac 1440

tttctcttca acggttctgt catttcagga ccaggattca ctggtggaga cctcgttaga 1500

ctcaacagca gtggaaataa cattcagaat agagggtata ttgaagttcc aattcacttc 1560

ccatccacat ctaccagata tagagttcgt gtgaggtatg cttctgtgac ccctattcac 1620

ctcaacgtta attggggtaa ttcatccatc ttctccaata cagttccagc tacagctacc 1680

tccttggata atctccaatc cagcgatttc ggttactttg aaagtgccaa tgcttttaca 1740

tcttcactcg gtaacatcgt gggtgttaga aactttagtg ggactgcagg agtgattatc 1800

gacagattcg agttcattcc agttactgca acactcgagg ctgaatataa tctggaaaga 1860

gcgcagaagg cggtaatgcg ctgtttacgt ctacaaacca gcttggactc aagacaaatg 1920

g 1921

<210> 6
<211> 1921
<212> DNA
<213> Artificial sequence

<220>
<223> Native Bt nucleotide sequence encoding N-terminal 450 HD-1 (Cry1Ab) amino acids and 451-615 of Bkt HD73 (Cry1Ac) described in Example 3 and as set forth in the upper line of Figure 4

<400> 6
atggataaca atccgaacat caatgaatgc attccttata attgtttaag taaccctgaa 60

gtagaagtat taggtggaga aagaatagaa actggttaca ccccaatcga tatttccttg 120

tcgctaacgc aatttctttt gagtgaattt gttcccggtg ctggatttgt gttaggacta 180

gttgatataa tatggggaat ttttggtccc tctcaatggg acgcatttct tgtacaaatt 240

gaacagttaa ttaaccaaag aatagaagaa ttcgctagga accaagccat ttctagatta 300

gaaggactaa gcaatcttta tcaaatttac gcagaatctt ttagagagtg ggaagcagat 360

cctactaatc cagcattaag agaagagatg cgtattcaat tcaatgacat gaacagtgcc 420

cttacaaccg ctattcctct ttttgcagtt caaaattatc aagttcctct tttatcagta 480

tatgttcaag ctgcaaattt acatttatca gttttgagag atgtttcagt gtttggacaa 540

aggtggggat ttgatgccgc gactatcaat agtcgttata atgatttaac taggcttatt 600

ggcaactata cagatcatgc tgtacgctgg tacaatacgg gattagagcg tgtatgggga 660

ccggattcta gagattggat aagatataat caatttagaa gagaattaac actaactgta 720

ttagatatcg tttctctatt tccgaactat gatagtagaa cgtatccaat tcgaacagtt 780

tcccaattaa caagagaaat ttatacaaac ccagtattag aaaattttga tggtagtttt 840

cgaggctcgg ctcagggcat agaaggaagt attaggagtc cacatttgat ggatatactt 900

aatagtataa ccatctatac ggatgctcat agaggagaat attattggtc agggcatcaa 960

ataatggctt ctcctgtagg gttttcgggg ccagaattca cttttccgct atatggaact 1020

atgggaaatg cagctccaca acaacgtatt gttgctcaac taggtcaggg cgtgtataga 1080

acattatcgt ccaccttata tagaagacct tttaatatag ggataaataa tcaacaacta 1140

tctgttcttg acgggacaga atttgcttat ggaacctcct caaatttgcc atccgctgta 1200

tacagaaaaa gcggaacggt agattcgctg gatgaaatac cgccacagaa taacaacgtg 1260

ccacctaggc aaggatttag tcatcgatta agccatgttt caatgtttcg ttcaggcttt 1320

agtaatagta gtgtaagtat aataagagct cctatgttct cttggataca tcgtagtgct 1380

gaatttaata atataattgc atcggatagt attactcaaa tccctgcagt gaagggaaac 1440

tttcttttta atggttctgt aatttcagga ccaggattta ctggtgggga cttagttaga 1500

ttaaatagta gtggaaataa cattcagaat agagggtata ttgaagttcc aattcacttc 1560

ccatcgacat ctaccagata tcgagttcgt gtacggtatg cttctgtaac cccgattcac 1620

ctcaacgtta attggggtaa ttcatccatt ttttccaata cagtaccagc tacagctacg 1680

tcattagata atctacaatc aagtgatttt ggttattttg aaagtgccaa tgcttttaca 1740

tcttcattag gtaatatagt aggtgttaga aattttagtg ggactgcagg agtgataata 1800

gacagatttg aatttattcc agttactgca acactcgagg ctgaatataa tctggaaaga 1860

gcgcagaagg cggtgaatgc gctgtttacg tctacaaacc aactagggct aaaaacaaat 1920

g 1921

<210> 7
<211> 1767
<212> DNA
<213> Artificial sequence

<220>
<223> Truncated synthetic sequence encoding a hybrid Btk HD73 (Cry1Ac) from amino acid 29-615 and including codons encoding N-terminal MET-ALA as described in Example 3 and set forth in the lower line of Figure 8

<400> 7
atggccattg aaaccggtta cactcccatc gacatctcct tgtccttgac acagtttctg 60

ctcagcgagt tcgtgccagg tgctgggttc gttctcggac tagttgacat catctggggt 120

atctttggtc catctcaatg ggatgcattc ctggtgcaaa ttgagcagtt gatcaaccag 180

aggatcgaag agttcgccag gaaccaggcc atctctaggt tggaaggatt gagcaatctc 240

taccaaatct atgcagagag cttcagagag tgggaagccg atcctactaa cccagctctc 300

cgcgaggaaa tgcgtattca attcaacgac atgaacagcg ccttgaccac agctatccca 360

ttgttcgcag tccagaacta ccaagttcct ctcttgtccg tgtacgttca agcagctaat 420

cttcacctca gcgtgcttcg agacgttagc gtgtttgggc aaaggtgggg attcgatgct 480

gcaaccatca atagccgtta caacgacctt actaggctga ttggaaacta caccgaccac 540

gctgttcgtt ggtacaacac tggcttggag cgtgtctggg gtcctgattc tagagattgg 600

attagataca accagttcag gagagaattg accctcacag ttttggacat tgtgtctctc 660

ttcccgaact atgactccag aacctaccct atccgtacag tgtcccaact taccagagaa 720

atctatacta acccagttct tgagaacttc gacggtagct tccgtggttc tgcccaaggt 780

atcgaaggct ccatcaggag cccacacttg atggacatct tgaacagcat aactatctac 840

accgatgctc acagaggaga gtattactgg tctggacacc agatcatggc ctctccagtt 900

ggattcagcg ggcccgagtt taccttttcct ctctatggaa ctatgggaaa cgccgctcca 960

caacaacgta tcgttgctca actaggtcag ggtgtctaca gaaccttgtc ttccaccttg 1020

tacagaagac ccttcaatat cggtatcaac aaccagcaac tttccgttct tgacggaaca 1080

gagttcgcct atggaacctc ttctaacttg ccatccgctg tttacagaaa gagcggaacc 1140

gttgattcct tggacgaaat cccaccacag aacaacaatg tgccacccag gcaaggattc 1200

tcccacaggt tgagccacgt gtccatgttc cgttccggat tcagcaacag ttccgtgagc 1260

atcatcagag ctcctatgtt ctcttggata caccgtagtg ctgagttcaa caacatcatc 1320

gcatccgata gtattactca aatccctgca gtgaagggaa actttctctt caacggttct 1380

gtcatttcag gaccaggatt cactggtgga gacctcgtta gactcaacag cagtggaaat 1440

aacattcaga atagagggta tattgaagtt ccaattcact tcccatccac atctaccaga 1500

tatagagttc gtgtgaggta tgcttctgtg acccctattc acctcaacgt taattggggt 1560

aattcatcca tcttctccaa tacagttcca gctacagcta cctccttgga taatctccaa 1620

tccagcgatt tcggttactt tgaaagtgcc aatgctttta catcttcact cggtaacatc 1680

gtgggtgtta gaaactttag tgggactgca ggagtgatta tcgacagatt cgagttcatt 1740

ccagttactg caacactcga ggctgag 1767

<210> 8
<211> 1767
<212> DNA
<213> Artificial sequence

<220>
<223> Native Bt sequence encoding hybrid Btk HD-73 (Cry1Ac), described in Example 3 and set forth in the upper line of Figure 8

<400> 8
gaaagaatag aaactggtta caccccaatc gatatttcct tgtcgctaac gcaatttctt 60

ttgagtgaat ttgttcccgg tgctggattt gtgttaggac tagttgatat aatatgggga 120

atttttggtc cctctcaatg ggacgcattt cttgtacaaa ttgaacagtt aattaaccaa 180

agaatagaag aattcgctag gaaccaagcc atttctagat tagaaggact aagcaatctt 240

tatcaaattt acgcagaatc ttttagagag tgggaagcag atcctactaa tccagcatta 300

agagaagaga tgcgtattca attcaatgac atgaacagtg cccttacaac cgctattcct 360

ctttttgcag ttcaaaatta tcaagttcct cttttatcag tatatgttca agctgcaaat 420

ttacatttat cagttttgag agatgtttca gtgtttggac aaaggtgggg atttgatgcc 480

gcgactatca atagtcgtta taatgattta actaggctta ttggcaacta tacagatcat 540

gctgtacgct ggtacaatac gggattagag cgtgtatggg gaccggattc tagagattgg 600

ataagatata atcaatttag aagagaatta acactaactg tattagatat cgtttctcta 660

tttccgaact atgatagtag aacgtatcca attcgaacag tttcccaatt aacaagagaa 720

atttatacaa acccagtatt agaaaatttt gatggtagtt ttcgaggctc ggctcagggc 780

atagaaggaa gtattaggag tccacatttg atggatatac ttaatagtat aaccatctat 840

acggatgctc atagaggaga atattattgg tcagggcatc aaataatggc ttctcctgta 900

gggttttcgg ggccagaatt cacttttccg ctatatggaa ctatgggaaa tgcagctcca 960

caacaacgta ttgttgctca actaggtcag ggcgtgtata gaacattatc gtccacctta 1020

tatagaagac cttttaatat agggataaat aatcaacaac tatctgttct tgacgggaca 1080

gaatttgctt atggaacctc ctcaaatttg ccatccgctg tatacagaaa aagcggaacg 1140

gtagattcgc tggatgaaat accgccacag aataacaacg tgccacctag gcaaggattt 1200

agtcatcgat taagccatgt ttcaatgttt cgttcaggct ttagtaatag tagtgtaagt 1260

ataataagag ctcctatgtt ctcttggata catcgtagtg ctgaatttaa taatataatt 1320

gcatcggata gtattactca aatccctgca gtgaagggaa actttctttt taatggttct 1380

gtaatttcag gaccaggatt tactggtggg gacttagtta gattaaatag tagtggaaat 1440

aacattcaga atagagggta tattgaagtt ccaattcact tcccatcgac atctaccaga 1500

tatcgagttc gtgtacggta tgcttctgta accccgattc acctcaacgt taattggggt 1560

aattcatcca ttttttccaa tacagtacca gctacagcta cgtcattaga taatctacaa 1620

tcaagtgatt ttggttattt tgaaagtgcc aatgctttta catcttcatt aggtaatata 1680

gtaggtgtta gaaattttag tgggactgca ggagtgataa tagacagatt tgaatttatt 1740

ccagttactg caacactcga ggctgaa 1767

<210> 9
<211> 3534
<212> DNA
<213> Artificial sequence

<220>
<223> synthetic/wild-type full length sequence encoding HD-73(Cry1Ac), 1st 1845 nucleotides set forth lower line Fig 4, 1846-end is native sequence encoding C-terminus of HD73, described in Ex 3, set forth in the lower line of Figure 9

<400> 9
atggacaaca acccaaacat caacgaatgc attccataca actgcttgag taacccagaa 60

gttgaagtac ttggtggaga acgcattgaa accggttaca ctcccatcga catctccttg 120

tccttgacac agtttctgct cagcgagttc gtgccaggtg ctgggttcgt tctcggacta 180

gttgacatca tctggggtat ctttggtcca tctcaatggg atgcattcct ggtgcaaatt 240

gagcagttga tcaaccagag gatcgaagag ttcgccagga accaggccat ctctaggttg 300

gaaggattga gcaatctcta ccaaatctat gcagagagct tcagagagtg ggaagccgat 360

cctactaacc cagctctccg cgaggaaatg cgtattcaat tcaacgacat gaacagcgcc 420

ttgaccacag ctatcccatt gttcgcagtc cagaactacc aagttcctct cttgtccgtg 480

tacgttcaag cagctaatct tcacctcagc gtgcttcgag acgttagcgt gtttgggcaa 540

aggtggggat tcgatgctgc aaccatcaat agccgttaca acgaccttac taggctgatt 600

ggaaactaca ccgaccacgc tgttcgttgg tacaacactg gcttggagcg tgtctggggt 660

cctgattcta gagattggat tagatacaac cagttcagga gagaattgac cctcacagtt 720

ttggacattg tgtctctctt cccgaactat gactccagaa cctaccctat ccgtacagtg 780

tcccaactta ccagagaaat ctatactaac ccagttcttg agaacttcga cggtagcttc 840

cgtggttctg cccaaggtat cgaaggctcc atcaggagcc cacacttgat ggacatcttg 900

aacagcataa ctatctacac cgatgctcac agaggagagt attactggtc tggacaccag 960

atcatggcct ctccagttgg attcagcggg cccgagttta cctttcctct ctatggaact 1020

atgggaaacg ccgctccaca acaacgtatc gttgctcaac taggtcaggg tgtctacaga 1080

accttgtctt ccaccttgta cagaagaccc ttcaatatcg gtatcaacaa ccagcaactt 1140

tccgttcttg acggaacaga gttcgcctat ggaacctctt ctaacttgcc atccgctgtt 1200

tacagaaaga gcggaaccgt tgattccttg gacgaaatcc caccacagaa caacaatgtg 1260

ccacccaggc aaggattctc ccacaggttg agccacgtgt ccatgttccg ttccggattc 1320

agcaacagtt ccgtgagcat catcagagct cctatgttct cttggataca ccgtagtgct 1380

gagttcaaca acatcatcgc atccgatagt attactcaaa tccctgcagt gaagggaaac 1440

tttctcttca acggttctgt catttcagga ccaggattca ctggtggaga cctcgttaga 1500

ctcaacagca gtggaaataa cattcagaat agagggtata ttgaagttcc aattcacttc 1560

ccatccacat ctaccagata tagagttcgt gtgaggtatg cttctgtgac ccctattcac 1620

ctcaacgtta attggggtaa ttcatccatc ttctccaata cagttccagc tacagctacc 1680

tccttggata atctccaatc cagcgatttc ggttactttg aaagtgccaa tgcttttaca 1740

tcttcactcg gtaacatcgt gggtgttaga aactttagtg ggactgcagg agtgattatc 1800

gacagattcg agttcattcc agttactgca acactcgagg ctgaatataa tctggaaaga 1860

gcgcagaagg cggtgaatgc gctgtttacg tctacaaacc aactagggct aaaaacaaat 1920

gtaacggatt atcatattga tcaagtgtcc aatttagtta cgtatttatc ggatgaattt 1980

tgtctggatg aaaagcgaga attgtccgag aaagtcaaac atgcgaagcg actcagtgat 2040

gaacgcaatt tactccaaga ttcaaatttc aaagacatta ataggcaacc agaacgtggg 2100

tggggcggaa gtacagggat taccatccaa ggaggggatg acgtatttaa agaaaattac 2160

gtcacactat caggtacctt tgatgagtgc tatccaacat atttgtatca aaaaatcgat 2220

gaatcaaaat taaaagcctt tacccgttat caattaagag ggtatatcga agatagtcaa 2280

gacttagaaa tctatttaat tcgctacaat gcaaaacatg aaacagtaaa tgtgccaggt 2340

acgggttcct tatggccgct ttcagcccaa agtccaatcg gaaagtgtgg agagccgaat 2400

cgatgcgcgc cacaccttga atggaatcct gacttagatt gttcgtgtag ggatggagaa 2460

aagtgtgccc atcattcgca tcatttctcc ttagacattg atgtaggatg tacagactta 2520

aatgaggacc taggtgtatg ggtgatcttt aagattaaga cgcaagatgg gcacgcaaga 2580

ctagggaatc tagagtttct cgaagagaaa ccattagtag gagaagcgct agctcgtgtg 2640

aaaagagcgg agaaaaaatg gagagacaaa cgtgaaaaat tggaatggga aacaaatatc 2700

gtttataaag aggcaaaaga atctgtagat gctttatttg taaactctca atatgatcaa 2760

ttacaagcgg atacgaatat tgccatgatt catgcggcag ataaacgtgt tcatagcatt 2820

cgagaagctt atctgcctga gctgtctgtg attccgggtg tcaatgcggc tatttttgaa 2880

gaattagaag ggcgtatttt cactgcattc tccctatatg atgcgagaaa tgtcattaaa 2940

aatggtgatt ttaataatgg cttatcctgc tggaacgtga aagggcatgt agatgtagaa 3000

gaacaaaaca accaacgttc ggtccttgtt gttccggaat gggaagcaga agtgtcacaa 3060

gaagttcgtg tctgtccggg tcgtggctat atccttcgtg tcacagcgta caaggaggga 3120

tatggagaag gttgcgtaac cattcatgag atcgagaaca atacagacga actgaagttt 3180

agcaactgcg tagaagagga aatctatcca aataacacgg taacgtgtaa tgattatact 3240

gtaaatcaag aagaatacgg aggtgcgtac acttctcgta atcgaggata taacgaagct 3300

ccttccgtac cagctgatta tgcgtcagtc tatgaagaaa aatcgtatac agatggacga 3360

agagagaatc cttgtgaatt taacagaggg tatagggatt acacgccact accagttggt 3420

tatgtgacaa aagaattaga atacttccca gaaaccgata aggtatggat tgagattgga 3480

gaaacggaag gaacatttat cgtggacagc gtggaattac tccttatgga ggaa 3534

<210> 10
<211> 3534
<212> DNA
<213> Bacillus thuringiensis

<220>

<223> wild type full length HD73 (Cry1Ac) gene, described in Example 3 and set forth in upper line of Figures 9-11

<400> 10

atggataaca atccgaacat caatgaatgc attccttata attgtttaag taaccctgaa 60

gtagaagtat taggtggaga aagaatagaa actggttaca ccccaatcga tatttccttg 120

tcgctaacgc aatttctttt gagtgaattt gttcccggtg ctggatttgt gttaggacta 180

gttgatataa tatggggaat ttttggtccc tctcaatggg acgcatttct tgtacaaatt 240

gaacagttaa ttaaccaaag aatagaagaa ttcgctagga accaagccat ttctagatta 300

gaaggactaa gcaatcttta tcaaatttac gcagaatctt ttagagagtg ggaagcagat 360

cctactaatc cagcattaag agaagagatg cgtattcaat tcaatgacat gaacagtgcc 420

cttacaaccg ctattcctct ttttgcagtt caaaattatc aagttcctct tttatcagta 480

tatgttcaag ctgcaaattt acatttatca gttttgagag atgtttcagt gtttggacaa 540

aggtggggat ttgatgccgc gactatcaat agtcgttata atgatttaac taggcttatt 600

ggcaactata cagatcatgc tgtacgctgg tacaatacgg gattagagcg tgtatgggga 660

ccggattcta gagattggat aagatataat caatttagaa gagaattaac actaactgta 720

ttagatatcg tttctctatt tccgaactat gatagtagaa cgtatccaat tcgaacagtt 780

tcccaattaa caagagaaat ttatacaaac ccagtattag aaaattttga tggtagtttt 840

cgaggctcgg ctcagggcat agaaggaagt attaggagtc cacatttgat ggatatactt 900

aatagtataa ccatctatac ggatgctcat agaggagaat attattggtc agggcatcaa 960

ataatggctt ctcctgtagg gttttcgggg ccagaattca cttttccgct atatggaact 1020

atgggaaatg cagctccaca acaacgtatt gttgctcaac taggtcaggg cgtgtataga 1080

acattatcgt ccaccttata tagaagacct tttaatatag ggataaataa tcaacaacta 1140

tctgttcttg acgggacaga atttgcttat ggaacctcct caaatttgcc atccgctgta 1200

tacagaaaaa gcggaacggt agattcgctg gatgaaatac cgccacagaa taacaacgtg 1260

ccacctaggc aaggatttag tcatcgatta agccatgttt caatgtttcg ttcaggcttt 1320

agtaatagta gtgtaagtat aataagagct cctatgttct cttggataca tcgtagtgct 1380

gaatttaata atataattgc atcggatagt attactcaaa tccctgcagt gaagggaaac 1440

tttctttta atggttctgt aatttcagga ccaggattta ctggtgggga cttagttaga 1500

ttaaatagta gtggaaataa cattcagaat agagggtata ttgaagttcc aattcacttc 1560

ccatcgacat ctaccagata tcgagttcgt gtacggtatg cttctgtaac cccgattcac 1620

ctcaacgtta attggggtaa ttcatccatt ttttccaata cagtaccagc tacagctacg 1680

tcattagata atctacaatc aagtgatttt ggttattttg aaagtgccaa tgcttttaca 1740

tcttcattag gtaatatagt aggtgttaga aattttagtg ggactgcagg agtgataata 1800

gacagatttg aatttattcc agttactgca acactcgagg ctgaatataa tctggaaaga 1860

gcgcagaagg cggtgaatgc gctgtttacg tctacaaacc aactagggct aaaaacaaat 1920

gtaacggatt atcatattga tcaagtgtcc aatttagtta cgtatttatc ggatgaattt 1980

tgtctggatg aaaagcgaga attgtccgag aaagtcaaac atgcgaagcg actcagtgat 2040

gaacgcaatt tactccaaga ttcaaatttc aaagacatta ataggcaacc agaacgtggg 2100

tggggcggaa gtacagggat taccatccaa ggaggggatg acgtatttaa agaaaattac 2160

gtcacactat caggtacctt tgatgagtgc tatccaacat atttgtatca aaaaatcgat 2220

gaatcaaaat taaaagcctt tacccgttat caattaagag ggtatatcga agatagtcaa 2280

gacttagaaa tctatttaat tcgctacaat gcaaaacatg aaacagtaaa tgtgccaggt 2340

acgggttcct tatggccgct ttcagcccaa agtccaatcg gaaagtgtgg agagccgaat 2400

cgatgcgcgc cacaccttga atggaatcct gacttagatt gttcgtgtag ggatggagaa 2460

aagtgtgccc atcattcgca tcatttctcc ttagacattg atgtaggatg tacagactta 2520

aatgaggacc taggtgtatg ggtgatcttt aagattaaga cgcaagatgg gcacgcaaga 2580

ctagggaatc tagagtttct cgaagagaaa ccattagtag gagaagcgct agctcgtgtg 2640

aaaagagcgg agaaaaaatg gagagacaaa cgtgaaaaat tggaatggga aacaaatatc 2700

gtttataaag aggcaaaaga atctgtagat gctttatttg taaactctca atatgatcaa 2760

ttacaagcgg atacgaatat tgccatgatt catgcggcag ataaacgtgt tcatagcatt 2820

cgagaagctt atctgcctga gctgtctgtg attccgggtg tcaatgcggc tatttttgaa 2880

gaattagaag ggcgtatttt cactgcattc tccctatatg atgcgagaaa tgtcattaaa 2940

aatggtgatt ttaataatgg cttatcctgc tggaacgtga aagggcatgt agatgtagaa 3000

gaacaaaaca accaacgttc ggtccttgtt gttccggaat gggaagcaga agtgtcacaa 3060

gaagttcgtg tctgtccggg tcgtggctat atccttcgtg tcacagcgta caaggaggga 3120

tatggagaag gttgcgtaac cattcatgag atcgagaaca atacagacga actgaagttt 3180

agcaactgcg tagaagagga aatctatcca ataacacgg taacgtgtaa tgattatact 3240

gtaaatcaag aagaatacgg aggtgcgtac acttctcgta atcgaggata taacgaagct 3300

ccttccgtac cagctgatta tgcgtcagtc tatgaagaaa aatcgtatac agatggacga 3360

agagagaatc cttgtgaatt taacagaggg tatagggatt acacgccact accagttggt 3420

tatgtgacaa aagaattaga atacttccca gaaaccgata aggtatggat tgagattgga 3480

gaaacggaag gaacatttat cgtggacagc gtggaattac tccttatgga ggaa 3534

<210> 11
<211> 3534
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic/modified sequence encoding HD73 (CryAc)described in Example 3 and set forth as lower line in Figure 10

<400> 11

atggacaaca acccaaacat caacgaatgc attccataca actgcttgag taacccagaa 60

gttgaagtac ttggtggaga acgcattgaa accggttaca ctcccatcga catctccttg 120

tccttgacac agtttctgct cagcgagttc gtgccaggtg ctgggttcgt tctcggacta 180

gttgacatca tctggggtat ctttggtcca tctcaatggg atgcattcct ggtgcaaatt 240

gagcagttga tcaaccagag gatcgaagag ttcgccagga accaggccat ctctaggttg 300

gaaggattga gcaatctcta ccaaatctat gcagagagct tcagagagtg ggaagccgat 360

cctactaacc cagctctccg cgaggaaatg cgtattcaat tcaacgacat gaacagcgcc 420

ttgaccacag ctatcccatt gttcgcagtc cagaactacc aagttcctct cttgtccgtg 480

tacgttcaag cagctaatct tcacctcagc gtgcttcgag acgttagcgt gtttgggcaa 540

aggtggggat tcgatgctgc aaccatcaat agccgttaca acgaccttac taggctgatt 600

ggaaactaca ccgaccacgc tgttcgttgg tacaacactg gcttggagcg tgtctggggt 660

cctgattcta gagattggat tagatacaac cagttcagga gagaattgac cctcacagtt 720

ttggacattg tgtctctctt cccgaactat gactccagaa cctaccctat ccgtacagtg 780

tcccaactta ccagagaaat ctatactaac ccagttcttg agaacttcga cggtagcttc 840

cgtggttctg cccaaggtat cgaaggctcc atcaggagcc cacacttgat ggacatcttg 900

aacagcataa ctatctacac cgatgctcac agaggagagt attactggtc tggacaccag 960

atcatggcct ctccagttgg attcagcggg cccgagttta cctttcctct ctatggaact 1020

atgggaaacg ccgctccaca acaacgtatc gttgctcaac taggtcaggg tgtctacaga 1080

accttgtctt ccaccttgta cagaagaccc ttcaatatcg gtatcaacaa ccagcaactt 1140

tccgttcttg acggaacaga gttcgcctat ggaacctctt ctaacttgcc atccgctgtt 1200

tacagaaaga gcggaaccgt tgattccttg gacgaaatcc caccacagaa caacaatgtg 1260

ccacccaggc aaggattctc ccacaggttg agccacgtgt ccatgttccg ttccggattc 1320

agcaacagtt ccgtgagcat catcagagct cctatgttct cttggataca ccgtagtgct 1380

gagttcaaca acatcatcgc atccgatagt attactcaaa tccctgcagt gaagggaaac 1440

tttctcttca acggttctgt catttcagga ccaggattca ctggtggaga cctcgttaga 1500

ctcaacagca gtggaaataa cattcagaat agagggtata ttgaagttcc aattcacttc 1560

ccatccacat ctaccagata tagagttcgt gtgaggtatg cttctgtgac ccctattcac 1620

ctcaacgtta attggggtaa ttcatccatc ttctccaata cagttccagc tacagctacc 1680

tccttggata atctccaatc cagcgatttc ggttactttg aaagtgccaa tgcttttaca 1740

tcttcactcg gtaacatcgt gggtgttaga aactttagtg ggactgcagg agtgattatc 1800

gacagattcg agttcattcc agttactgca acactcgagg ctgaatataa tctggaaaga 1860

gcgcagaagg cggtgaatgc gctgtttacg tctacaaacc agctcggcct caagaccaat 1920

gtgacggatt atcatattga tcaagtgtcc aacttggtga cctacctcag cgatgagttc 1980

tgtctggatg aaaagcgaga attgtccgag aaagtcaaac atgcgaagcg actcagtgat 2040

gaacgcaatt tactccaaga ttcaaatttc aaagacatta ataggcaacc agaacgtggg 2100

tggggcggaa gtacagggat taccatccag ggaggtgacg acgtgttcaa ggagaactac 2160

gtcacactat caggtacctt tgatgagtgc tatccaacat acctctacca gaagatcgac 2220

gagtccaagt tgaaagcctt tacccgttat caattaagag ggtatatcga agatagtcaa 2280

gacctcgaga tctacctcat ccgctacaat gcaaaacatg aaacagtaaa tgtgccaggt 2340

acgggttcct tatggccgct ttcagcccaa agtccaatcg gaaagtgtgg agagccgaat 2400

cgatgcgcgc cacaccttga atggaatcct gacttagatt gttcgtgtag ggatggagaa 2460

aagtgtgccc atcattcgca tcatttctcc ttagacattg atgtaggatg tacagactta 2520

aatgaggacc taggtgtatg ggtgatcttt aagattaaga cgcaagatgg gcacgcaaga 2580

ctagggaatc tagagtttct cgaagagaaa ccattagtag gagaagcgct agctcgtgtg 2640

aaaagagcgg agaaaaaatg gagagacaaa cgtgagaagt tggaatggga gaccaacatc 2700

gtctacaaag aggcaaaaga atctgtagat gctttatttg taaactctca atatgatcaa 2760

ttacaagcgg atacgaatat tgccatgatt catgcggcag ataaacgtgt tcatagcatt 2820

cgagaagctt atctgcctga gctgtctgtg attccgggtg tcaatgcggc tatttttgaa 2880

gaattagaag ggcgtatttt cactgcattc tccctctacg atgccagaaa cgtcatcaag 2940

aacggtgact tcaacaatgg cttatcctgc tggaacgtga aagggcatgt agatgtagaa 3000

gaacaaaaca accaacgttc ggtccttgtt gttccggaat gggaagcaga agtgtcacaa 3060

gaagttcgtg tctgtccggg tcgtggctat atccttcgtg tcacagcgta caaggaggga 3120

tatggagaag gttgcgtaac cattcatgag atcgagaaca atacagacga actgaagttt 3180

agcaactgcg tagaagagga aatctatcca ataaacacgg taacgtgtaa tgattatact 3240

gtaaatcaag aagaatacgg aggtgcgtac acttctcgta atcgaggata taacgaagct 3300

ccttccgtac cagctgatta tgcgtcagtc tatgaagaaa aatcgtatac agatggacga 3360

agagagaatc cttgtgaatt taacagaggg tatagggatt acacgccact accagttggt 3420

tatgtgacaa aagaattaga atacttccca gaaaccgata aggtatggat tgagattgga 3480

gaaacggaag gaacatttat cgtggacagc gtggaattac tccttatgga ggaa 3534

<210> 12
<211> 3534
<212> DNA
<213> Artificial sequence

<220>
<223> Fully synthetic sequence encoding insecticidal toxin encoding HD-73 (Cry1Ac) described in Example 3 and set forth in the lower line of Figure 11

<400> 12
atggacaaca acccaaacat caacgaatgc attccataca actgcttgag taacccagaa 60

gttgaagtac ttggtggaga acgcattgaa accggttaca ctcccatcga catctccttg 120

tccttgacac agtttctgct cagcgagttc gtgccaggtg ctgggttcgt tctcggacta 180

gttgacatca tctggggtat ctttggtcca tctcaatggg atgcattcct ggtgcaaatt 240

gagcagttga tcaaccagag gatcgaagag ttcgccagga accaggccat ctctaggttg 300

gaaggattga gcaatctcta ccaaatctat gcagagagct tcagagagtg ggaagccgat 360

cctactaacc cagctctccg cgaggaaatg cgtattcaat tcaacgacat gaacagcgcc 420

ttgaccacag ctatcccatt gttcgcagtc cagaactacc aagttcctct cttgtccgtg 480

tacgttcaag cagctaatct tcacctcagc gtgcttcgag acgttagcgt gtttgggcaa 540

aggtggggat tcgatgctgc aaccatcaat agccgttaca acgaccttac taggctgatt 600

ggaaactaca ccgaccacgc tgttcgttgg tacaacactg gcttggagcg tgtctggggt 660

cctgattcta gagattggat tagatacaac cagttcagga gagaattgac cctcacagtt 720

ttggacattg tgtctctctt cccgaactat gactccagaa cctaccctat ccgtacagtg 780

tcccaactta ccagagaaat ctatactaac ccagttcttg agaacttcga cggtagcttc 840

cgtggttctg cccaaggtat cgaaggctcc atcaggagcc cacacttgat ggacatcttg 900

aacagcataa ctatctacac cgatgctcac agaggagagt attactggtc tggacaccag 960

atcatggcct ctccagttgg attcagcggg cccgagttta cctttcctct ctatggaact 1020

atgggaaacg ccgctccaca acaacgtatc gttgctcaac taggtcaggg tgtctacaga 1080

accttgtctt ccaccttgta cagaagaccc ttcaatatcg gtatcaacaa ccagcaactt 1140

tccgttcttg acggaacaga gttcgcctat ggaacctctt ctaacttgcc atccgctgtt 1200

tacagaaaga gcggaaccgt tgattccttg gacgaaatcc caccacagaa caacaatgtg 1260

ccacccaggc aaggattctc ccacaggttg agccacgtgt ccatgttccg ttccggattc 1320

agcaacagtt ccgtgagcat catcagagct cctatgttct cttggataca ccgtagtgct 1380

gagttcaaca acatcatcgc atccgatagt attactcaaa tccctgcagt gaagggaaac 1440

tttctcttca acggttctgt catttcagga ccaggattca ctggtggaga cctcgttaga 1500

ctcaacagca gtggaaataa cattcagaat agagggtata ttgaagttcc aattcacttc 1560

ccatccacat ctaccagata tagagttcgt gtgaggtatg cttctgtgac ccctattcac 1620

ctcaacgtta attggggtaa ttcatccatc ttctccaata cagttccagc tacagctacc 1680

tccttggata atctccaatc cagcgatttc ggttactttg aaagtgccaa tgcttttaca 1740

tcttcactcg gtaacatcgt gggtgttaga aactttagtg ggactgcagg agtgattatc 1800

gacagattcg agttcattcc agttactgca acactcgagg ctgagtacaa ccttgagaga 1860

gcccagaagg ctgtgaacgc cctctttacc tccaccaatc agcttggctt gaaaactaac 1920

gttactgact atcacattga ccaagtgtcc aacttggtca cctaccttag cgatgagttc 1980

tgcctcgacg agaagcgtga actctccgag aaagttaaac acgccaagcg tctcagcgac 2040

gagaggaatc tcttgcaaga ctccaacttc aaagacatca acaggcagcc agaacgtggt 2100

tggggtggaa gcaccgggat caccatccaa ggaggcgacg atgtgttcaa ggagaactac 2160

gtcaccctct ccggaacttt cgacgagtgc taccctacct acttgtacca gaagatcgat 2220

gagtccaaac tcaaagcctt caccaggtat caacttagag gctacatcga agacagccaa 2280

gaccttgaaa tctactcgat caggtacaat gccaagcacg agaccgtgaa tgtcccaggt 2340

actggttccc tctggccact ttctgcccaa tctcccattg ggaagtgtgg agagcctaac 2400

agatgcgctc cacaccttga gtggaatcct gacttggact gctcctgcag ggatggcgag 2460

aagtgtgccc accattctca tcacttctcc ttggacatcg atgtgggatg tactgacctg 2520

aatgaggacc tcggagtctg ggtcatcttc aagatcaaga cccaagacgg acacgcaaga 2580

cttggcaacc ttgagtttct cgaagagaaa ccattggtcg gtgaagctct cgctcgtgtg 2640

aagagagcag agaagaagtg gagggacaaa cgtgagaaac tcgaatggga aactaacatc 2700

gtttacaagg aggccaaaga gtccgtggat gctttgttcg tgaactccca atatgatcag 2760

ttgcaagccg acaccaacat cgccatgatc cacgccgcag acaaacgtgt gcacagcatt 2820

cgtgaggctt acttgcctga gttgtccgtg atccctggtg tgaacgctgc catcttcgag 2880

gaacttgagg gacgtatctt taccgcattc tccttgtacg atgccagaaa cgtcatcaag 2940

aacggtgact tcaacaatgg cctcagctgc tggaatgtga aaggtcatgt ggacgtggag 3000

gaacagaaca atcagcgttc cgtcctggtt gtgcctgagt gggaagctga agtgtcccaa 3060

gaggttagag tctgtccagg tagaggctac attctccgtg tgaccgctta caaggaggga 3120

tacggtgagg gttgcgtgac catccacgag atcgagaaca acaccgacga gcttaagttc 3180

tccaactgcg tcgaggaaga aatctatccc aacaacaccg ttacttgcaa cgactacact 3240

gtgaatcagg aagagtacgg aggtgcctac actagccgta acagaggtta caacgaagct 3300

ccttccgttc ctgctgacta tgcctccgtg tacgaggaga aatcctacac agatggcaga 3360

cgtgagaacc cttgcgagtt caacagaggt tacagggact acacaccact tccagttggc 3420

tatgttacca aggagcttga gtactttcct gagaccgaca aagtgtggat cgagatcggt 3480

gaaaccgagg gaaccttcat cgtggacagc gtggagcttc tcttgatgga ggaa 3534

<210> 13
<211> 3531
<212> DNA
<213> Artificial sequence

<220>
<223> Nucleotide sequence described as HD-73 (Cry1Ac) in Example 3 (page 59, lines 13-16), nucleotide 1-1830 as set forth in lower line of Figure 11

<400> 13
atggacaaca acccaaacat caacgaatgc attccataca actgcttgag taacccagaa 60

gttgaagtac ttggtggaga acgcattgaa accggttaca ctcccatcga catctccttg 120

tccttgacac agtttctgct cagcgagttc gtgccaggtg ctgggttcgt tctcggacta 180

gttgacatca tctggggtat ctttggtcca tctcaatggg atgcattcct ggtgcaaatt 240

gagcagttga tcaaccagag gatcgaagag ttcgccagga accaggccat ctctaggttg 300

gaaggattga gcaatctcta ccaaatctat gcagagagct tcagagagtg ggaagccgat 360

cctactaacc cagctctccg cgaggaaatg cgtattcaat tcaacgacat gaacagcgcc 420

ttgaccacag ctatcccatt gttcgcagtc cagaactacc aagttcctct cttgtccgtg 480

tacgttcaag cagctaatct tcacctcagc gtgcttcgag acgttagcgt gtttgggcaa 540

aggtggggat tcgatgctgc aaccatcaat agccgttaca acgaccttac taggctgatt 600

ggaaactaca ccgaccacgc tgttcgttgg tacaacactg gcttggagcg tgtctggggt 660

cctgattcta gagattggat tagatacaac cagttcagga gagaattgac cctcacagtt 720

ttggacattg tgtctctctt cccgaactat gactccagaa cctaccctat ccgtacagtg 780

tcccaactta ccagagaaat ctatactaac ccagttcttg agaacttcga cggtagcttc 840

cgtggttctg cccaaggtat cgaaggctcc atcaggagcc cacacttgat ggacatcttg 900

aacagcataa ctatctacac cgatgctcac agaggagagt attactggtc tggacaccag 960

atcatggcct ctccagttgg attcagcggg cccgagttta cctttcctct ctatggaact 1020

atgggaaacg ccgctccaca acaacgtatc gttgctcaac taggtcaggg tgtctacaga 1080

accttgtctt ccaccttgta cagaagaccc ttcaatatcg gtatcaacaa ccagcaactt 1140

tccgttcttg acggaacaga gttcgcctat ggaacctctt ctaacttgcc atccgctgtt 1200

tacagaaaga gcggaaccgt tgattccttg gacgaaatcc caccacagaa caacaatgtg 1260

ccacccaggc aaggattctc ccacaggttg agccacgtgt ccatgttccg ttccggattc 1320

agcaacagtt ccgtgagcat catcagagct cctatgttct catggattca tcgtagtgct 1380

gagttcaaca atatcattcc ttcctctcaa atcacccaaa tcccattgac caagtctact 1440

aaccttggat ctggaacttc tgtcgtgaaa ggaccaggct tcacaggagg tgatattctt 1500

agaagaactt ctcctggcca gattagcacc ctcagagtta acatcactgc accactttct 1560

caaagatatc gtgtcaggat tcgttacgca tctaccacta acttgcaatt ccacacctcc 1620

atcgacggaa ggcctatcaa tcagggtaac ttctccgcaa ccatgtcaag cggcagcaac 1680

ttgcaatccg gcagcttcag aaccgtcggt ttcactactc ctttcaactt ctctaacgga 1740

tcaagcgttt tcacccttag cgctcatgtg ttcaattctg gcaatgaagt gtacattgac 1800

cgtattgagt ttgtgcctgc cgaagttacc ctcgaggctg agtacaacct tgagagagcc 1860

cagaaggctg tgaacgccct ctttacctcc accaatcagc ttggcttgaa aactaacgtt 1920

actgactatc acattgacca agtgtccaac ttggtcacct accttagcga tgagttctgc 1980

ctcgacgaga agcgtgaact ctccgagaaa gttaaacacg ccaagcgtct cagcgacgag 2040

aggaatctct tgcaagactc caacttcaaa gacatcaaca ggcagccaga acgtggttgg 2100

ggtggaagca ccgggatcac catccaagga ggcgacgatg tgttcaagga gaactacgtc 2160

accctctccg gaactttcga cgagtgctac cctacctact tgtaccagaa gatcgatgag 2220

tccaaactca aagccttcac caggtatcaa cttagaggct acatcgaaga cagccaagac 2280

cttgaaatct actcgatcag gtacaatgcc aagcacgaga ccgtgaatgt cccaggtact 2340

ggttccctct ggccactttc tgcccaatct cccattggga agtgtggaga gcctaacaga 2400

tgcgctccac accttgagtg gaatcctgac ttggactgct cctgcaggga tggcgagaag 2460

tgtgcccacc attctcatca cttctccttg gacatcgatg tgggatgtac tgacctgaat 2520

gaggacctcg gagtctgggt catcttcaag atcaagaccc aagacggaca cgcaagactt 2580

ggcaaccttg agtttctcga agagaaacca ttggtcggtg aagctctcgc tcgtgtgaag 2640

agagcagaga agaagtggag ggacaaacgt gagaaactcg aatgggaaac taacatcgtt 2700

tacaaggagg ccaaagagtc cgtggatgct ttgttcgtga actcccaata tgatcagttg 2760

caagccgaca ccaacatcgc catgatccac gccgcagaca aacgtgtgca cagcattcgt 2820

gaggcttact tgcctgagtt gtccgtgatc cctggtgtga acgctgccat cttcgaggaa 2880

cttgagggac gtatctttac cgcattctcc ttgtacgatg ccagaaacgt catcaagaac 2940

ggtgacttca acaatggcct cagctgctgg aatgtgaaag gtcatgtgga cgtggaggaa 3000

cagaacaatc agcgttccgt cctggttgtg cctgagtggg aagctgaagt gtcccaagag 3060

gttagagtct gtccaggtag aggctacatt ctccgtgtga ccgcttacaa ggagggatac 3120

ggtgagggtt gcgtgaccat ccacgagatc gagaacaaca ccgacgagct taagttctcc 3180

aactgcgtcg aggaagaaat ctatcccaac aacaccgtta cttgcaacga ctacactgtg 3240

aatcaggaag agtacggagg tgcctacact agccgtaaca gaggttacaa cgaagctcct 3300

tccgttcctg ctgactatgc ctccgtgtac gaggagaaat cctacacaga tggcagacgt 3360

gagaaccctt gcgagttcaa cagaggttac agggactaca caccacttcc agttggctat 3420

gttaccaagg agcttgagta ctttcctgag accgacaaag tgtggatcga gatcggtgaa 3480

accgagggaa ccttcatcgt ggacagcgtg gagcttctct tgatggagga a 3531

<210> 14
<211> 1791
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic nucleotide sequence encoding a Btt toxin (Cry3Aa), described in Example 5 and set forth in the lower line in Figure 12

<400> 14
atgactgcag acaacaacac cgaagccctc gacagttcta ccactaagga tgttatccag 60

aagggtatct ccgttgtggg agacctcttg ggcgtggttg gatttccctt cggtggagcc 120

ctcgtgagct tctatacaaa ctttctcaac accatttggc caagcgagga cccttggaaa 180

gcattcatgg agcaagttga agctcttatg gatcagaaga ttgcagatta tgccaagaac 240

aaggctttgg cagaactcca gggccttcag aacaatgtgg aggactacgt gagtgcattg 300

tccagctggc agaagaaccc tgttagctcc agaaatcctc acagccaagg taggatcaga 360

gagttgttct ctcaagccga atcccacttc agaaattcca tgcctagctt tgctatctcc 420

ggttacgagg ttcttttcct cactacctat gctcaagctg ccaacaccca cttgtttctc 480

cttaaggacg ctcaaatcta tggagaagag tggggatacg agaaagagga cattgctgag 540

ttctacaagc gtcaacttaa gctcacccaa gagtacactg accattgcgt gaaatggtat 600

aacgttggtc tcgataagct cagaggctct tcctacgagt cttgggtgaa cttcaacaga 660

tacaggagag agatgacctt gactgtgctc gatcttatcg cactctttcc cttgtacgat 720

gtgagactct acccaaagga agtgaaaact gagcttacca gagacgtgct cactgaccct 780

attgtcggag tcaacaacct taggggttat ggaactacct tcagcaatat cgaaaactac 840

attaggaaac cacatctctt cgactatctt cacagaattc aattccacac aaggtttcaa 900

ccaggatact atggtaacga ctccttcaac tattggtccg gtaactatgt ttccaccaga 960

ccaagcattg gatctaatga catcatcaca tctcccttct atggtaacaa gtccagtgaa 1020

cctgtgcaga accttgagtt caacggcgag aaagtctata gagccgtcgc aaacaccaat 1080

ctcgctgtgt ggccatccgc agtttactca ggcgtcacaa aggtggagtt tagtcagtat 1140

aacgatcaga ccgatgaggc cagcacccag acttacgact ccaaacgtaa cgttggcgca 1200

gtctcttggg attctatcga ccaattgcct ccagaaacca cagacgaacc attggagaag 1260

ggctacagcc accaacttaa ctatgtgatg tgcttcttga tgcaaggttc cagagggacc 1320

attccagtgt tgacctggac acacaagtcc gtggacttct tcaacatgat cgatagcaag 1380

aagatcactc aacttccctt ggtgaaagcc tacaagctgc aatctggtgc ttccgttgtc 1440

gcaggtccca gattcactgg aggtgacatc atccagtgca cagagaacgg cagcgcagct 1500

actatctacg tgacacctga tgtgtcttac tctcagaagt acagggcacg tattcattac 1560

gcatctacca gccagatcac cttcacactc agcttggatg gagcaccctt caaccagtat 1620

tactttgaca agaccatcaa caaaggtgac actctcacat acaatagctt caacttggca 1680

agtttcagca caccatttga actctcaggc aacaatcttc agatcggcgt caccggtctc 1740

agcgccggag acaaagtcta catcgacaag attgagttca tcccagtgaa c 1791

<210> 15
<211> 1791
<212> DNA
<213> Artificial sequence

<220>
<223> Btt toxin (Cry3Aa), Example 5 and upper line in Figure 12

<400> 15
atgactgcag ataataatac ggaagcacta gatagctcta caacaaaaga tgtcattcaa 60

aaaggcattt ccgtagtagg tgatctccta ggcgtagtag gtttcccgtt tggtggagcg 120

cttgtttcgt tttatacaaa ctttttaaat actatttggc caagtgaaga cccgtggaag 180

gcttttatgg aacaagtaga agcattgatg gatcagaaaa tagctgatta tgcaaaaaat 240

aaagctcttg cagagttaca gggccttcaa aataatgtcg aagattatgt gagtgcattg 300

agttcatggc aaaaaaatcc tgtgagttca cgaaatccac atagccaggg gcggataaga 360

gagctgtttt ctcaagcaga aagtcatttt cgtaattcaa tgccttcgtt tgcaatttct 420

ggatacgagg ttctatttct aacaacatat gcacaagctg ccaacacaca tttatttta 480

ctaaaagacg ctcaaattta tggagaagaa tggggatacg aaaaagaaga tattgctgaa 540

ttttataaaa gacaactaaa acttacgcaa gaatatactg accattgtgt caaatggtat 600

aatgttggat tagataaatt aagaggttca tcttatgaat cttgggtaaa ctttaaccgt 660

tatcgcagag agatgacatt aacagtatta gatttaattg cactatttcc attgtatgat 720

gttcggctat acccaaaaga agttaaaacc gaattaacaa gagacgtttt aacagatcca 780

attgtcggag tcaacaacct taggggctat ggaacaacct tctctaatat agaaaattat 840

attcgaaaac cacatctatt tgactatctg catagaattc aatttcacac gcggttccaa 900

ccaggatatt atggaaatga ctctttcaat tattggtccg gtaattatgt ttcaactaga 960

ccaagcatag gatcaaatga tataatcaca tctccattct atggaaataa atccagtgaa 1020

cctgtacaaa atttagaatt taatggagaa aaagtctata gagccgtagc aaatacaaat 1080

cttgcggtct ggccgtccgc tgtatattca ggtgttacaa aagtggaatt tagccaatat 1140

aatgatcaaa cagatgaagc aagtacacaa acgtacgact caaaaagaaa tgttggcgcg 1200

gtcagctggg attctatcga tcaattgcct ccagaaacaa cagatgaacc tctagaaaag 1260

ggatatagcc atcaactcaa ttatgtaatg tgctttttaa tgcagggtag tagaggaaca 1320

atcccagtgt taacttggac acataaaagt gtagactttt ttaacatgat tgattcgaaa 1380

aaaattacac aacttccgtt agtaaaggca tataagttac aatctggtgc ttccgttgtc 1440

gcaggtccta ggtttacagg aggagatatc attcaatgca cagaaaatgg aagtgcggca 1500

actatttacg ttacaccgga tgtgtcgtac tctcaaaaat atcgagctag aattcattat 1560

gcttctacat ctcagataac atttacactc agtttagacg gggcaccatt taatcaatac 1620

tatttcgata aaacgataaa taaaggagac acattaacgt ataattcatt taatttagca 1680

agtttcagca caccattcga attatcaggg aataacttac aaataggcgt cacaggatta 1740

agtgctggag ataaagttta tatagacaaa attgaattta ttccagtgaa t 1791

<210> 16
<211> 1902
<212> DNA
<213> Artificial sequence

<220>

<223> Synthetic nucleotide sequence encoding Bacillus thuringiensis kurstaki HD-1 insecticidal toxin P2 (Cry2Aa) described in Example 6 and set forth in the lower line in Figure 13

<400> 16

atggacaaca acgtcttgaa ctctggtaga acaaccatct gcgacgcata caacgtcgtg 60

gctcacgatc cattcagctt cgaacacaag agcctcgaca ctattcagaa ggagtggatg 120

gaatggaaac gtactgacca ctctctctac gtcgcacctg tggttggaac agtgtccagc 180

ttccttctca agaaggtcgg ctctctcatc ggaaaacgta tcttgtccga actctggggt 240

atcatctttc catctgggtc cactaatctc atgcaagaca tcttgaggga gaccgaacag 300

tttctcaacc agcgtctcaa cactgatacc ttggctagag tcaacgctga gttgatcggt 360

ctccaagcaa acattcgtga gttcaaccag caagtggaca acttcttgaa tccaactcag 420

aatcctgtgc ctctttccat cacttcttcc gtgaacacta tgcagcaact cttcctcaac 480

agattgcctc agtttcagat tcaaggctac cagttgctcc ttcttccact ctttgctcag 540

gctgccaaca tgcacttgtc cttcatacgt gacgtgatcc tcaacgctga cgaatgggga 600

atctctgcag ccactcttag gacatacaga gactacttga ggaactacac tcgtgattac 660

tccaactatt gcatcaacac ttatcagact gcctttcgtg gactcaatac taggcttcac 720

gacatgcttg agttcaggac ctacatgttc cttaacgtgt ttgagtacgt cagcatttgg 780

agtctcttca agtaccagag cttgatggtg tcctctggag ccaatctcta cgcctctggc 840

agtggaccac agcaaactca gagcttcaca gctcagaact ggccattctt gtatagcttg 900

ttccaagtca actccaacta cattctcagt ggtatctctg ggaccagact ctccataacc 960

tttcccaaca ttggtggact tccaggctcc actacaaccc atagccttaa ctctgccaga 1020

gtgaactaca gtggaggtgt cagctctgga ttgattggtg caactaactt gaaccacaac 1080

ttcaattgct ccaccgtctt gccacctctg agcacaccgt ttgtgaggtc ctggcttgac 1140

agcggtactg atcgcgaagg agttgctacc tctacaaact ggcaaaccga gtccttccaa 1200

accactctta gccttcggtg tggagctttc tctgcacgtg ggaattcaaa ctactttcca 1260

gactacttca ttaggaacat ctctggtgtt cctctcgtca tcaggaatga agacctcacc 1320

cgtccacttc attacaacca gattaggaac atcgagtctc catccggtac tccaggaggt 1380

gcaagagctt acctcgtgtc tgtccataac aggaagaaca acatctacgc tgccaacgag 1440

aatggcacca tgattcacct tgcaccagaa gattacactg gattcaccat ctctccaatc 1500

catgctaccc aagtgaacaa tcagacacgc accttcatct ccgaaaagtt cggaaatcaa 1560

ggtgactcct tgaggttcga gcaatccaac actaccgcta ggtacacttt gagaggcaat 1620

ggaaacagct acaaccttta cttgagagtt agctccattg gtaactccac catccgtgtt 1680

accatcaacg gacgtgttta cacagtctct aatgtgaaca ctacaacgaa caatgatggc 1740

gttaacgaca acggagccag attcagcgac atcaacattg gcaacatcgt ggcctctgac 1800

aacactaacg ttactttgga catcaatgtg accctcaatt ctggaactcc atttgatctc 1860

atgaacatca tgtttgtgcc aactaacctc cctccattgt ac 1902

<210> 17
<211> 1899
<212> DNA
<213> Artificial sequence

<220>
<223> P2 (Cry2Aa), Example 6 and set forth in upper line in Figure 13

<400> 17
atgaataatg tattgaatag tggaagaaca actatttgtg atgcgtataa tgtagtagcc 60

catgatccat ttagttttga acataaatca ttagatacca tccaaaaaga atggatggag 120

tggaaaagaa cagatcatag tttatatgta gctcctgtag tcggaactgt gtctagtttt 180

ttgctaaaga aagtggggag tcttattgga aaaaggatat tgagtgaatt atgggggata 240

atatttccta gtggtagtac aaatctaatg caagatattt taagggagac agaacaattc 300

ctaaatcaaa gacttaatac agataccctt gctcgtgtaa atgcagaatt gatagggctc 360

caagcgaata taagggagtt taatcaacaa gtagataatt ttttaaaccc tactcaaaac 420

cctgttcctt tatcaataac ttcttcggtt aatacaatgc agcaattatt tctaaataga 480

ttaccccagt tccagataca aggataccag ttgttattat tacctttatt tgcacaggca 540

gccaatatgc atctttcttt tattagagat gttattctta atgcagatga atggggtatt 600

tcagcagcaa cattacgtac gtatcgagat tacctgagaa attatacaag agattattct 660

aattattgta taaatacgta tcaaactgcg tttagagggt taaacacccg tttacacgat 720

atgttagaat ttagaacata tatgttttta aatgtatttg aatatgtatc catttggtca 780

ttgtttaaat atcagagtct tatggtatct tctggcgcta atttatatgc tagcggtagt 840

ggaccacagc agacacaatc atttacagca caaaactggc catttttata ttctcttttc 900

caagttaatt cgaattatat attatctggt attagtggta ctaggctttc tattaccttc 960

cctaatattg gtggtttacc gggtagtact acaactcatt cattgaatag tgccagggtt 1020

aattatagcg gaggagtttc atctggtctc ataggggcga ctaatctcaa tcacaacttt 1080

aattgcagca cggtcctccc tcctttatca acaccatttg ttagaagttg gctggattca 1140

ggtacagatc gagagggcgt tgctacctct acgaattggc agacagaatc ctttcaaaca 1200

actttaagtt taaggtgtgg tgctttttca gcccgtggaa attcaaacta tttcccagat 1260

tattttatcc gtaatatttc tggggttcct ttagttatta gaaacgaaga tctaacaaga 1320

ccgttacact ataaccaaat aagaaatata gaaagtcctt cgggaacacc tggtggagca 1380

cgggcctatt tggtatctgt gcataacaga aaaaataata tctatgccgc taatgaaaat 1440

ggtactatga tccatttggc gccagaagat tatacaggat ttactatatc gccaatacat 1500

gccactcaag tgaataatca aactcgaaca tttatttctg aaaaatttgg aaatcaaggt 1560

gattccttaa gatttgaaca aagcaacacg acagctcgtt atacgcttag agggaatgga 1620

aatagttaca atctttattt aagagtatct tcaataggaa attcaactat tcgagttact 1680

ataaacggta gagtttatac tgtttcaaat gttaatacca ctacaaataa cgatggagtt 1740

aatgataatg gagctcgttt ttcagatatt aatatcggta atatagtagc aagtgataat 1800

actaatgtaa cgctagatat aaatgtgaca ttaaactccg gtactccatt tgatctcatg 1860

aatattatgt ttgtgccaac taatcttcca ccactttat 1899

<210> 18
<211> 3567
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic nucleotide sequence encoding Bt entomocidus insecticidal protein (Cry1Ca), described in Example 7 and set forth in the lower line of Figure 14

<400> 18
atggaggaga acaaccaaaa ccaatgcatt ccatacaact gcttgagtaa cccagaagag 60

gtattgcttg atggagaacg catttcaacc ggtaactctt ccatcgacat ctccttgtcc 120

ttggtccagt ttctggtcag caacttcgtg ccaggtggtg ggttccttgt cggactaatt 180

gacttcgtct ggggtatcgt tggtccatct caatgggatg cattcctggt gcaaattgag 240

cagttgatca acgagaggat cgctgagttc gccaggaacg ctgccatcgc taacttggaa 300

ggattgggca ataacttcaa catctatgtg gaggccttca aagagtggga agaggaccct 360

aacaacccag agacccgcac tagggtgatc gacagattca gaatcttgga cggcctcttg 420

gagagagata tcccatcctt cagaatctct ggcttcgaag ttcctctctt gtccgtgtac 480

gctcaagcag ctaatcttca cctcgctatc cttcgagaca gtgtcatctt tggggaaagg 540

tggggattga ccactatcaa cgtcaatgag aattacaaca gacttatcag gcacattgac 600

gagtacgccg accactgtgc taacacctac aaccgtggct tgaacaatct ccctaagtct 660

acttatcaag attggattac ctacaacagg ttgaggagag acttgaccct cacagttttg 720

gacattgcag ctttcttccc gaactatgac aacaggagat accctatcca accagtgggt 780

caacttacca gagaagtcta tactgaccca cttatcaact tcaaccctca gttgcaaagt 840

gtcgcccaac ttcccacatt caacgtcatg gagtccagcc gtatcaggaa cccacacttg 900

tttgacatct tgaacaacct tactatcttc accgattggt tcagcgttgg gcgtaacttc 960

tattggggtg gacacagggt catctcctct cttattggag gtgggaacat tacctctcct 1020

atctatggac gtgaggcaaa ccaggagcca ccacgtagtt tcaccttcaa cggtccagtc 1080

ttcagaacct tgtctaaccc taccttgaga ttgctccagc aaccttggcc agctccacct 1140

ttcaacctta gaggtgttga gggcgttgag ttctctactc ctaccaactc cttcacttac 1200

agaggtagag gaaccgttga ttccttgacc gaactcccac cagaggacaa tagcgtgcca 1260

cccagggaag gctactccca caggttgtgc cacgcaacct tcgtgcagcg ttccggaact 1320

ccattcctca ctacaggagt tgtgttctca tggactgatc gtagtgctac tctcactaat 1380

accattgatc ccgagaggat caatcaaatc ccattggtca agggtttccg tgtgtgggga 1440

ggaacttctg tcatcacagg accaggcttc acaggaggtg atattcttag aagaaacact 1500

tttggcgact ttgtgagcct ccaagttaac atcaactctc caattactca aagatatcgt 1560

ctcaggtttc gttacgcatc ttcccgtgac gctagagtca tcgtgctcac cggagcagct 1620

tctaccggtg tcggtggaca agtctccgtg aacatgccac tccagaagac tatggagatc 1680

ggcgagaact tgacatccag gaccttcaga tacaccgact tctctaaccc tttcagtttc 1740

cgtgccaacc ctgacatcat tggcattagc gaacaacctc tctttggagc tggtagcatc 1800

tcatctggcg aattgtacat tgacaagatt gagatcattc ttgccgacgc taccttcgag 1860

gctgagtctg accttgagag agcccagaag gctgtgaacg ccctctttac ctcctctaat 1920

cagattggct tgaaaactga cgttactgac tatcacattg accaagtgtc caacttggtc 1980

gactgcctta gcgatgagtt ctgcctcgac gagaagcgtg aactctccga gaaagttaaa 2040

cacgccaagc gtctcagcga cgagaggaat ctcttgcaag accccaactt cagaggcatc 2100

aacaggcagc cagaccgtgg ttggagagga agcaccgaca tcaccatcca aggaggcgac 2160

gatgtgttca aggagaacta cgtcaccctc ccaggaactg tggacgagtg ctaccctacc 2220

tacttgtacc agaagatcga tgagtccaaa ctcaaagcct acaccaggta tgaacttaga 2280

ggctacatcg aagacagcca agaccttgaa atctacctca tcaggtacaa tgccaagcac 2340

gagatcgtga atgtcccagg tactggttcc ctctggccac tttctgccca aatgcccatt 2400

gggaagtgtg gagagcctaa cagatgcgct ccacaccttg agtggaatcc tgacttggac 2460

tgctcctgca gggatggcga gaagtgtgcc caccattctc atcacttcac cttggacatc 2520

gatgtgggat gtactgacct gaatgaggac ctcggagtct gggtcatctt caagatcaag 2580

acccaagacg gacacgcaag acttggcaac cttgagtttc tcgaagagaa accattgctc 2640

ggtgaagctc tcgctcgtgt gaagagagca gagaagaagt ggagggacaa acgtgagaaa 2700

ctccaactcg agactaacat cgtttacaag gaggccaaag agtccgtgga tgctttgttc 2760

gtgaactccc aatatgatag gttgcaagtg gacaccaaca tcgccatgat ccacgctgca 2820

gacaaacgtg tgcacaggat tcgtgaggct tacttgcctg agttgtccgt gatccctggt 2880

gtgaacgctg ccatcttcga ggaacttgag ggacgtatct ttaccgcata ctccttgtac 2940

gatgccagaa acgtcatcaa gaacggtgac ttcaacaatg gcctcttgtg ctggaatgtg 3000

aaaggtcatg tggacgtgga ggaacagaac aatcaccgtt ccgtcctggt tatccctgag 3060

tgggaagctg aagtgtccca agaggttaga gtctgtccag gtagaggcta cattctccgt 3120

gtgaccgctt acaaggaggg atacggtgag ggttgcgtga ccatccacga gatcgaggac 3180

aacaccgacg agcttaagtt ctccaactgc gtcgaggaag aagtctatcc caacaacacc 3240

gttacttgca acaactacac tgggacccag gaagagtacg aaggtaccta cactagccgt 3300

aaccaaggtt acgacgaagc ttacggaaac aatccttccg ttcctgctga ctatgcctcc 3360

gtgtacgagg agaaatccta cacagatggc agacgtgaga acccttgcga gtccaacaga 3420

ggttacggtg actacacacc acttccagca ggctatgtta ccaaggacct tgagtacttt 3480

cctgagaccg acaaagtgtg gatcgagatc ggtgaaaccg agggaacctt catcgtggac 3540

agcgtggagc ttctcttgat ggaggaa 3567

<210> 19
<211> 3567
<212> DNA
<213> Artificial sequence

<220>
<223> BTent (Cy1Ca), Example 7 and set forth in upper line in Figure 14

<400> 19
atggaggaaa ataatcaaaa tcaatgcata ccttacaatt gtttaagtaa tcctgaagaa 60

gtacttttgg atggagaacg gatatcaact ggtaattcat caattgatat ttctctgtca 120

cttgttcagt ttctggtatc taactttgta ccaggggggag gatttttagt tggattaata 180

gattttgtat ggggaatagt tggcccttct caatgggatg catttctagt acaaattgaa 240

caattaatta atgaaagaat agctgaattt gctaggaatg ctgctattgc taatttagaa 300

ggattaggaa acaatttcaa tatatatgtg gaagcattta aagaatggga agaagatcct 360

aataatccag aaaccaggac cagagtaatt gatcgctttc gtatacttga tgggctactt 420

gaaagggaca ttccttcgtt tcgaatttct ggatttgaag tacccctttt atccgtttat 480

gctcaagcgg ccaatctgca tctagctata ttaagagatt ctgtaatttt tggagaaaga 540

tggggattga caacgataaa tgtcaatgaa aactataata gactaattag gcatattgat 600

gaatatgctg atcactgtgc aaatacgtat aatcggggat taaataattt accgaaatct 660

acgtatcaag attggataac atataatcga ttacggagag acttaacatt gactgtatta 720

gatatcgccg ctttctttcc aaactatgac aataggagat atccaattca gccagttggt 780

caactaacaa gggaagttta tacggaccca ttaattaatt ttaatccaca gttacagtct 840

gtagctcaat tacctacttt taacgttatg gagagcagcc gaattagaaa tcctcattta 900

tttgatatat tgaataatct tacaatcttt acggattggt ttagtgttgg acgcaatttt 960

tattggggag gacatcgagt aatatctagc cttataggag gtggtaacat aacatctcct 1020

atatatggaa gagaggcgaa ccaggagcct ccaagatcct ttacttttaa tggaccggta 1080

tttaggactt tatcaaatcc tactttacga ttattacagc aaccttggcc agcgccacca 1140

tttaatttac gtggtgttga aggagtagaa ttttctacac ctacaaatag ctttacgtat 1200

cgaggaagag gtacggttga ttctttaact gaattaccgc ctgaggataa tagtgtgcca 1260

cctcgcgaag gatatagtca tcgtttatgt catgcaactt ttgttcaaag atctggaaca 1320

ccttttttaa caactggtgt agtattttct tggaccgatc gtagtgcaac tcttacaaat 1380

acaattgatc cagagagaat taatcaaata cctttagtga aaggatttag agtttggggg 1440

ggcacctctg tcattacagg accaggattt acaggagggg atatccttcg aagaaatacc 1500

tttggtgatt ttgtatctct acaagtcaat attaattcac caattaccca aagataccgt 1560

ttaagatttc gttacgcttc cagtagggat gcacgagtta tagtattaac aggagcggca 1620

tccacaggag tgggaggcca agttagtgta aatatgcctc ttcagaaaac tatggaaata 1680

ggggagaact taacatctag aacatttaga tataccgatt ttagtaatcc tttttcattt 1740

agagctaatc cagatataat tgggataagt gaacaacctc tatttggtgc aggttctatt 1800

agtagcggtg aactttatat agataaaatt gaaattattc tagcagatgc aacatttgaa 1860

gcagaatctg atttagaaag agcacaaaag gcggtgaatg ccctgtttac ttcttccaat 1920

caaatcgggt taaaaaccga tgtgacggat tatcatattg atcaagtatc caatttagtg 1980

gattgtttat cagatgaatt ttgtctggat gaaaagcgag aattgtccga gaaagtcaaa 2040

catgcgaagc gactcagtga tgagcggaat ttacttcaag atccaaactt cagagggatc 2100

aatagacaac cagaccgtgg ctggagagga agtacagata ttaccatcca aggaggagat 2160

gacgtattca aagagaatta cgtcacacta ccgggtaccg ttgatgagtg ctatccaacg 2220

tatttatatc agaaaatага tgagtcgaaa ttaaaagctt atacccgtta tgaattaaga 2280

gggtatatcg aagatagtca agacttagaa atctatttga tccgttacaa tgcaaaacac 2340

gaaatagtaa atgtgccagg cacgggttcc ttatggccgc tttcagccca aatgccaatc 2400

ggaaagtgtg gagaaccgaa tcgatgcgcg ccacaccttg aatggaatcc tgatctagat 2460

tgttcctgca gagacgggga aaaatgtgca catcattccc atcatttcac cttggatatt 2520

gatgttggat gtacagactt aaatgaggac ttaggtgtat gggtgatatt caagattaag 2580

acgcaagatg gccatgcaag actagggaat ctagagtttc tcgaagagaa accattatta 2640

ggggaagcac tagctcgtgt gaaaagagcg gagaagaagt ggagagacaa acgagagaaa 2700

ctgcagttgg aaacaaatat tgtttataaa gaggcaaaag aatctgtaga tgctttattt 2760

gtaaactctc aatatgatag attacaagtg gatacgaaca tcgccatgat tcatgcggca 2820

gataaacgcg ttcatagaat ccgggaagcg tatctgccag agttgtctgt gattccaggt 2880

gtcaatgcgg ccattttcga agaattagag ggacgtattt ttacagcgta ttccttatat 2940

gatgcgagaa atgtcattaa aaatggcgat ttcaataatg gcttattatg ctggaacgtg 3000

aaaggtcatg tagatgtaga agagcaaaac aaccaccgtt cggtccttgt tatcccagaa 3060

tgggaggcag aagtgtcaca agaggttcgt gtctgtccag gtcgtggcta tatccttcgt 3120

gtcacagcat ataaagaggg atatggagag ggctgcgtaa cgatccatga gatcgaagac 3180

aatacagacg aactgaaatt cagcaactgt gtagaagagg aagtatatcc aaacaacaca 3240

gtaacgtgta ataattatac tgggactcaa gaagaatatg agggtacgta cacttctcgt 3300

aatcaaggat atgacgaagc ctatggtaat aacccttccg taccagctga ttacgcttca 3360

gtctatgaag aaaaatcgta tacagatgga cgaagagaga atccttgtga atctaacaga 3420

ggctatgggg attacacacc actaccggct ggttatgtaa caaaggattt agagtacttc 3480

ccagagaccg ataaggtatg gattgagatc ggagaaacag aaggaacatt catcgtggat 3540

agcgtggaat tactccttat ggaggaa 3567

<210> 20
<211> 762
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic sequence encoding PLRV coat protein, disclosed in Example 9 and set forth in lower line of Figure 16

<400> 20
agatctagag gtaattgtta tgagtactgt cgtggttaag ggaaacgtga acggtggtgt 60

tcaacaacct agaaggagaa gaaggcaatc ccttcgtagg agagctaaca gagttcagcc 120

agtggttatg gtcactgctc ctgggcaacc aagaaggaga agaaggagaa gaggaggtaa 180

tcgcagatca agaagaactg gagttcccag aggaagaggt tcaagcgaga cattcgtgtt 240

tacaaaggac aacctcgtgg gcaactccca aggaagtttc accttcggac caagtgtttc 300

agactgtcca gcattcaagg atggaatact caaggcttac catgagtaca agatcacaag 360

tatcttgctt cagttcgtca gcgaggcctc ttccacctct ccaggctcca tcgcttatga 420

gttagatcca cattgcaaag tttcatccct ccagtcctac gtcaacaagt tccaaatcac 480

aaagggtggt gctaagacct atcaagctcg tatgatcaac ggagttgaat ggcacgattc 540

ttctgaggat cagtgcagaa tcctttggaa aggaaatgga aagtcttcag atccagctgg 600

atctttcaga gttaccatca gagttgctct tcaaaaccca aagtaataga attcggatca 660

gagcctggtc caagcccaca accaacaccc actccaactc cccaaaagca tgagcgattt 720

attgcttacg tcggcatacc tatgctgacc attcaagaat tc 762

<210> 21
<211> 762
<212> DNA
<213> Artificial sequence

<220>
<223> Wild type PLRV coat protein coding sequence (nt 20-643), described in Example 9 paragraph 2, and as set forth in upper line of Figure 16

<400> 21
agatctagag gtaattgtta tgagtactgt cgtggttaag ggaaacgtca acggtggtgt 60

acaacaacct agaaggagga gaaggcaatc ccttcgcagg agggctaaca gagtacagcc 120

agtggttatg gtcactgctc ctggcgaacc caggaggagg agacgcagaa gaggaggcaa 180

tcgcaggtca agaagaactg gagttcccag gggaaggggc tcaagcgaga cattcgtgtt 240

tacaaaggac aacctcgtgg gcaactccca aggaagtttc accttcggac caagtgtatc 300

agactgtcca gcattcaagg atggaatact caaggcctac catgagtaca agatcacaag 360

tatccttctt cagttcgtca gcgaggcctc ttccacctca ccaggatcca tcgcttatga 420

gttggaccca cattgcaaag tatcatccct ccagtcctac gtcaacaagt tccaaatcac 480

aaagggagga gctaagacct atcaagctag gatgatcaac ggagtagaat ggcacgattc 540

atctgaggat cagtgcagga tactttggaa aggaagtgga aaatcttcag acccagcagg 600

atctttcaga gtcaccatca gagtggctct tcaaaacccc aagtaataga ctccggatca 660

gagcctggtc caagcccaca accaacaccc actccaactc cccaaaagca tgagcgattt 720

attgcttacg tcggcatacc tatgctgacc attcaagaat tc 762

<210> 22
<211> 18
<212> DNA
<213> Artificial sequence

<220>
<223> BTK185 primer, Example 1, Table III

<400> 22
tccccagata atatcaac 18

<210> 23
<211> 48
<212> DNA
<213> Artificial sequene

<220>
<223> BTK240 primer, Example 1, Table III

<400> 23
ggcttgattc ctagcgaact cttcgattct ctggttgatg agctgttc 48

<210> 24
<211> 54
<212> DNA
<213> Artificial sequence

<220>
<223> BTK462 primer, Example 1, Table III

<400> 24
caaaactgag aggtggaggt tggcagcttg aacgtacacg gagaggagag gaac 54

<210> 25
<211> 48
<212> DNA
<213> Artificial sequence

<220>
<223> BTK669 primer, Example 1, Table III

<400> 25
agttagtgta agctctcttc tgaactggtt gtacctgatc caatctct 48

<210> 26
<211> 39
<212> DNA
<213> Artificial sequence

<220>
<223> BTK930 primer, Example 1, Table III

<400> 26
agccatgatc tggtgaccgg accagtagta ttctcctct 39

<210> 27
<211> 32
<212> DNA
<213> Artificial sequence

<220>
<223> BTK1110 primer, Example 1, Table III

<400> 27
agttgttggt tgttgatccc gatgttaaaa gg 32

<210> 28
<211> 37
<212> DNA
<213> Artificial sequence

<220>
<223> BTK1380A primer, Example 1, Table III

<400> 28
gtgatgaagg gatgatgttg ttgaactcag cactacg 37

<210> 29
<211> 100
<212> DNA

<213> Artificial sequence

<220>
<223> BTK1380T primer, Example 1, Table III

<400> 29
cagaagttcc agagccaaga ttagtagact tggtgagtgg gatttgggtg atttgtgatg 60

aagggatgat gttgttgaac tcagcactac gatgtatcca 100

<210> 30
<211> 27
<212> DNA
<213> Artificial sequence

<220>
<223> BTK1600 primer, Example 1, Table III

<400> 30
tgatgtgtgg aactgaaggt ttgtggt 27

<210> 31
<211> 51
<212> DNA
<213> Artificial sequence

<220>
<223> BTK1363 primer, Example 3, Table VI

<400> 31
aatactatcg gatgcgatga tgttgttgaa ctcagcacta cggtgtatcc a 51

<210> 32
<211> 33
<212> DNA
<213> Artificial sequence

<220>
<223> 73K1437 primer, Example 3, Table VI

<400> 32
tcctgaaatg acagaaccgt tgaagagaaa gtt 33

<210> 33
<211> 48
<212> DNA
<213> Artificial sequence

<220>
<223> 73K1471 primer, Example 3, Table VI

<400> 33
atttccactg ctgttgagtc taacgaggtc tccaccagtg aatcctgg 48

<210> 34
<211> 61
<212> DNA
<213> Artificial sequence

<220>
<223> 73K1561 primer, Example 3, Table VI

<400> 34
gtgaataggg gtcacagaag catacctcac acgaactcta tatctggtag atgttggatg 60

g 61

<210> 35
<211> 33
<212> DNA
<213> Artificial sequence

<220>
<223> 73K1642 primer, Example 3, Table VI

<400> 35
tgtagctgga actgtattgg agaagatgga tga 33

<210> 36

<211> 48
<212> DNA
<213> Artificial sequence

<220>
<223> 73K1675 primer, Example 3, Table VI

<400> 36
ttcaaagtaa ccgaaatcgc tggattggag attatccaag gaggtagc 48

<210> 37
<211> 39
<212> DNA
<213> Artificial sequence

<220>
<223> 73K1741 primer, Example 3, Table VI

<400> 37
actaaagttt ctaacaccca cgatgttacc gagtgaaga 39

<210> 38
<211> 36
<212> DNA
<213> Artificial sequence

<220>
<223> 73K1797 primer, Example 3, Table VI

<400> 38
aactggaatg aactcgaatc tgtcgataat cactcc 36

<210> 39
<211> 54
<212> DNA
<213> Artificial sequence

<220>
<223> 73KTERM primer, Example 3, Table VI

<400> 39
ggacactaga tcttagtgat aatcggtcac atttgtcttg agtccaagct ggtt 54

<210> 40
<211> 10
<212> PRT
<213> Artificial sequence

<220>
<223> RUBISCO SSU CTP cleavage site sequence, described in Example 10

<400> 40

Gly Gly Arg Val Asn Cys Met Gln Ala Met
1 5 10